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EXPLORATIONS AND FIELD-WORK OF THE
SMITHSONIAN INSTITUTION
IN 1912



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EXPLORATIONS AND FIELD-WORK OF THE SMITHSONIAN INSTITUTION IN 1912

In 1912, as in preceding years, The Smithsonian Institution carried on field-work in various parts of the world by means of small allotments from its funds, and by coöperating with institutions and individuals engaged in similar activities. Several friends of the Institution contributed funds for special work, or provided opportunities for participation in explorations which they had undertaken personally or through the aid of others.

All these operations resulted in extending the boundaries of knowledge, and in several cases added important material to the collections of the National Museum. The Institution is obliged every year to forego opportunities for important work in many fields. With larger means it could engage in more extensive field operations which could confidently be expected to yield rich returns both in increase of knowledge and in additions to the national collections.

Most of the information contained in this account has been furnished by those who participated in the various expeditions.

About twenty different parties were in the field during 1912, and the regions visited comprised British East Africa, Abyssinia, Algeria, eastern Siberia and Mongolia, the Altai Mountain district, Borneo, St. Lawrence Island, Alaska, British Columbia, Alberta, Newfoundland, Labrador, the Panama Canal Zone, the Bahama Islands, the West Indies, and many parts of the United States.

Some of the work done in 1912 was in continuation of operations initiated in previous years, and described in the article on explorations published by the Smithsonian some months ago.¹ As regards the Government branches of the Institution, it should be said that the Bureau of American Ethnology engages largely in field-work as a

¹ Expeditions Organized or Participated in by the Smithsonian Institution in 1910 and 1911, Smithsonian Misc. Coll., Vol. 59, No. 11, 1912.

part of its regular activities. The National Museum has no special funds for exploration, and on that account can embrace only a few of the opportunities which are presented for enlarging its collections



FIG. 1.—A native of Borneo. Photograph by Streeter.

through field-work. The Astrophysical Observatory occasionally obtains funds from Congress for observations outside the United States. The functions of the other branches—the National Zoölogical Park, the International Exchanges, the Regional Bureau of the

International Catalogue of Scientific Literature—are not of such a character as to involve work of the kind now under consideration.

A ZOÖLOGICAL AND ETHNOLOGICAL EXPEDITION TO DUTCH EAST BORNEO, MAINTAINED BY DR. W. L. ABBOTT

As a result of the zoölogical and ethnological explorations carried on for many years by Dr. W. L. Abbott in the East Indies, the National Museum, through his generosity, contains the largest and most important collections from that part of the world to be found in any museum. Having discontinued the work himself, he was, nevertheless, desirous that collections should be made in Dutch East Borneo, a region which he had not visited, and with much liberality he provided the means for sending Mr. H. C. Raven into that territory to procure characteristic mammals as well as any ethnological material that might prove of interest. A letter from Mr. Raven, who left the United States about March 1, 1912, and is still in the field, announces that he has had a successful trip and has made a large collection.

MR. D. D. STREETER'S EXPEDITION TO BORNEO

Mr. Daniel Denison Streeter, Jr., of Brooklyn, N. Y., offered his services as a volunteer collaborator for the National Museum. He sailed from New York about April 15, 1912, and returned to the United States in December. He passed from Sarawak into Dutch Borneo by ascending the Rejang River and crossing the mountains on the dividing line to the Kajan River. He then ascended to the head of this river, and crossed another range to the head-waters of the Mahakam River which he descended to the Strait of Macassar. A small but interesting collection of mammals was secured, including two skulls of the Rhinoceros.



FIG. 2.—Kuching, Sarawak, Borneo. Photograph by Streeter.



FIG. 3.—Kuching, Sarawak, Borneo. Photograph by Streeter.



FIG. 4.—View in Sarawak, Borneo. Photograph by Streeter.



FIG. 5.—View of the interior of town of Kuching, Sarawak, Borneo. Photograph by Streeter.

MR. GEORGE MIXTER'S COLLECTING TRIP TO LAKE BAIKAL

Another collaborator of the National Museum, Mr. George Mixer, of Boston, Massachusetts, an experienced big-game hunter, volunteered to collect large mammals for the Museum in the vicinity of Lake Baikal, Siberia, during the summer of 1912. The main object of Mr. Mixer's trip was to secure specimens of the native bear and of the seal peculiar to Lake Baikal, neither of which was represented in the collections of the National Museum. He succeeded



FIG. 6.—Skull of a Siberian bear, from near Lake Baikal, collected by Mr. Mixer. Photograph by National Museum.

in obtaining good specimens of both. The bear skull shown in figure 6 is from his collection.

DR. W. L. ABBOTT'S OPERATIONS IN CASHMERE

Dr. W. L. Abbott, to whom reference has already been made, returned to Cashmere early in the spring of 1912, when he interested himself in trapping and studying the habits of the smaller mammals of that country. He sent to the National Museum many valuable specimens and much interesting information.

THE ZOÖLOGICAL EXPEDITION OF DR. THEODORE LYMAN TO
THE ALTAI MOUNTAINS, SIBERIA AND MONGOLIA

By the invitation of Dr. Theodore Lyman, of Harvard University, the National Museum was enabled to participate, in coöperation with the Museum of Comparative Zoölogy, in a zoölogical expedition to the Altai Mountains of Siberia and Mongolia. As this region was unrepresented by specimens in the National Museum, the opportunity afforded was an exceptionally important one. The expedition was under the personal direction of Doctor Lyman who



FIG. 7.—Collecting camp in the Altai Mountains near the Mongolian border.
Photograph by Hollister.

devoted his time chiefly to the collecting of large game. The National Museum was represented by Mr. N. Hollister, assistant curator of mammals, who had as his assistant in the work of collecting the smaller vertebrates, Conrad Kain, of Vienna, Austria.

The party left America in May, 1912, and returned in September of the same year. It entered Asia by way of the Trans-Siberian Railroad. The railway was left at Novonikolevsk, on the Obi River, and the long journey southward to the last Russian post near the Mongolian border was made by river boat and tarantass in 17 days. At this outpost, Kosh-Agatch, Kalmak and Tartar guides and packers were secured, and the frontier range to the southward was then explored for a month. The collecting was done

chiefly on the Siberian side of the range, but expeditions were made to the Mongolian slopes for great game, and down to the Suok



FIG. 8.—Kirghiz marmot-hunter; the white tail in his right hand is waved to hold the marmot's attention until the gun is in position for the shot.
 Photograph by Hollister.



FIG. 9.—The collecting party breaking camp on the Teligan-Burgazi River.
 Photograph by Hollister.

Plains, in the country of the Kirghiz. All this region is absolutely without trees or shrubs and, owing to its great altitude, is cold and stormy. A singular meteorological phenomenon in these mountains

is the frequent occurrence of electrical hail storms. The severity of these storms and the display of electricity accompanying them is terrific. During the entire trip the party enjoyed only three days without rain or snow. The average altitude of camps here was from 8,500 to 9,000 feet, and above this plane the mountains rise to snow and glacier covered peaks of 12,000 feet or more. The country is wild, barren, and desolate; and the only inhabitants, the nomadic Kirghiz and Kalnuks, are engaged in following their herds of yaks, horses, and goats.



FIG. 10.—Skull of a wild sheep, collected on the Altai expedition by Doctor Lyman. Photograph by the National Museum.

On the return trip, stops were made on the Chuisaya Steppe and in the heavily forested Altai between the desert and the great Siberian plains. Three different physiographical regions are represented in the collections, which include an almost complete series of the mammals and birds of this little-known part of central Asia. Chief among the specimens of great game are four fine rams of *Ovis ammon*, the largest of all wild sheep. There are also specimens of two species of ibex and a gazelle. Thirteen forms of mammals collected are new to science, and some twenty others taken were not before represented in the collections of the National Museum. In all, about 650 mammals and birds were secured, and will be divided between the two institutions concerned.

A SEARCH IN EASTERN ASIA FOR THE RACE THAT PEOPLED AMERICA

During the summer of 1912, Dr. Aleš Hrdlička visited, partly under the auspices of the Smithsonian Institution and partly in the interest of the Panama-California Exposition of San Diego, certain portions of Siberia and Mongolia in search for possible remains of the race that peopled America, whose home, according to all indications, was in eastern Asia.



FIG. 11.—A family of Yenisei Ostiaks. Photograph from the Ethnographical and Anthropological Museum of Peter the Great, St. Petersburg.

The journey extended to certain regions in southern Siberia, both west and east of Lake Baikal, and to Mongolia as far as Urga. It furnished an opportunity for a rapid survey, from the anthropological standpoint, of the field, and was made in connection with a prolonged research into the problems of the origin of the American aborigines carried on by Dr. Hrdlička on both parts of the American continent.

The studies of American anthropologists and archeologists have for a long time been contributing to the opinion that the American

native did not originate in America, but is the result, speaking geologically, of a fairly recent immigration into this country; that he is physically and otherwise most closely related to the yellow-brown peoples of eastern Asia and Polynesia; and that in all probability he represents, in the main at least, a gradual overflow in the past from north-eastern Siberia.

If these views be correct, then it seems that there ought to exist to

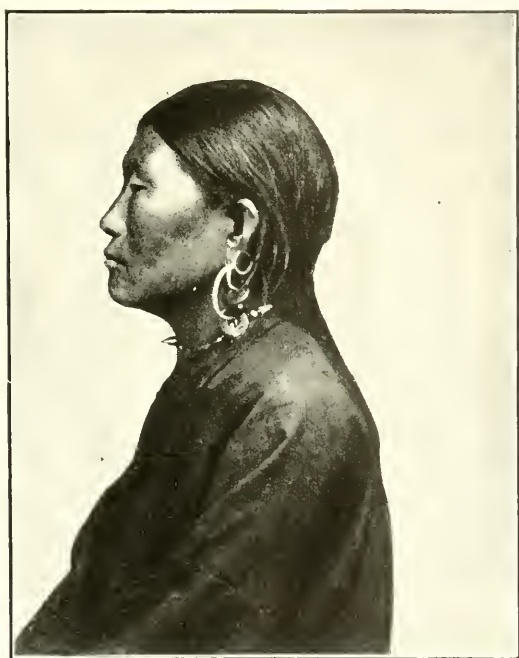


FIG. 12.—A Giliak woman from Sachalin.
Photograph donated by Prof. J. Talko-Hryniewicz.

this day, in some parts of eastern Asia, archeological remains and possibly even actual survivals, of the physical stock from which the American aborigines resulted, and every later publication that dealt with archeological exploration in eastern Asia, or brought photographs of the natives, has in one way or another strengthened these expectations.

A visit was made to certain parts of southeastern Siberia and to northern Mongolia. It included Urga, the capital of outer Mongolia, which encloses two great monasteries, and is constantly visited by

a large number of the natives from all parts of the country. Besides the field observations an examination was also made of the anthropological collections in the various Siberian museums within the area covered. The results were unexpectedly rich.

Dr. Hrdlička saw or was told of thousands upon thousands of burial mounds or "kourgans," dating from the present time back to the period when nothing but stone implements were used by man in



FIG. 13.—Oroczi, on the stream Koni, Eastern Siberia. Photograph donated by Prof. J. Talko-Hryncewicz.

those regions. And he saw and learned of numerous large caverns, particularly in the mountains bordering the Yenisei River, which yield human remains and offer excellent opportunities for investigation.

In regard to the living people, there were opportunities of seeing numerous Buriats, representatives of a number of tribes on the Yenisei and Abacan Rivers, many thousands of Mongolians, a number of Tibetans, and many Chinese, with a few Manchurians. On one occasion alone, that of an important religious ceremony, 7,000 natives could be seen assembled from all parts of Mongolia.

Among all these people there are visible many and unmistakable traces of admixture or persistence of what appears to have been the older population of these regions, pre-Mongolian and especially pre-Chinese, and those best representing these vestiges resemble to the point of identity the American Indian. These men, women, and children are brown in color, have black straight hair, dark brown eyes, and facial as well as bodily features which remind one most forcibly of the native Americans. Many of them, especially the women and children, if introduced among the Indians, and dressed to correspond, could by no means at the disposal of the anthropologist be distinguished apart. The similarities extend to the mental make-up of the people, and even to numerous habits and customs which new contacts and religions have not as yet been able to efface.

As a result of what he saw, Dr. Hrdlička expresses the belief that there exist to-day over large parts of eastern Siberia, and in Mongolia, Tibet, and other regions in that part of the world, numerous remains of an ancient population (related in origin perhaps with the latest paleolithic European), which was physically identical with and in all probability gave rise to the American Indian.

RESULTS OF MR. PAUL J. RAINEY'S EAST AFRICAN HUNTING EXPEDITION

Mr. Rainey's hunting trip was mentioned in the account of the Smithsonian expeditions of 1911.¹ He returned to America in December of that year, but Mr. Edmund Heller, who accompanied him as Smithsonian naturalist and collector, remained some time longer in British East Africa. The itinerary given last year was somewhat incorrect, as the original plan was changed after the party was organized.

The expedition arrived at Mombasa on March 22, 1911, and immediately proceeded by train over the Uganda Railway to Nairobi. The preparations for hunting and collecting were made there, and as soon as the safari was organized the expedition began active field operations. Proceeding southwestward from Nairobi, the safari passed over a high, rolling plateau to the Loita Plains, or Sotik District. Game was found here in great abundance. Many lions were living in the district, having been attracted by the great herds of antelopes and zebras. Six months were spent in hunting lions with dogs, and in making collections of the large and small mammals.

¹ *Op. cit.*, p. 2.

Twenty-eight lions were secured during this time, and the expedition returned to Nairobi over the same route by which it had entered the district. After a short delay at Nairobi, the safari proceeded northward to the desert region on the Abyssinian frontier. Only the northern edge of this desert could be explored owing to the lack of camels for transportation, as all these animals had been recently acquired by the government for military purposes. The route from Nairobi lay directly northward to Fort Hall, thence along the west slope of Mount Kenia to Nyeri. From this station the party traveled along the north slope of the great mountain for a few days and then struck directly northward into the low, dry, thorn brush desert. This desert extends several hundred miles northward to the Abyssinian Highlands, but only the southern part of it was visited. It is a very dry, hot region, of limited water supply, and long journeys are often necessary between waterholes or springs. Hunting operations were confined chiefly to the immediate vicinity of some of these waterholes since a fairly large per cent of the game animals inhabiting the district require water and visit the springs daily for their supply. The fauna here is identical with that of Somaliland in character, and very different from that of the East African highlands. Specimens of nearly all the species of mammals of this country were secured, including a cow elephant with record tusks.

Mr. Heller explored faunally two of the high mountains in the desert region. The highest of these was Mount Garguez which has an altitude of 8,000 feet, and is isolated by many miles of desert from its nearest neighbors. Its summit is covered by a dense forest similar to that found on Mt. Kenia. Previous to this trip the mountain had never been visited by a naturalist, and several new races of mammals were secured in the forest on its summit. Mr. Heller also visited another isolated mountain, Tololakin, a mountain somewhat lower and not so thickly forested, which showed a less specialized mammal fauna. After completing the survey of these two mountains, he proceeded to the Guaso Nyiro River and followed its course westward to the station of Nyeri, whence his route lay over the high plateau of the Aberdare Range and then down to Naivasha Station.

Mr. Rainey, in the meantime, had trained a second pack of hounds and in two months bagged over forty lions, sixteen of which were obtained in one day.

Mr. Heller then proceeded down the Uganda Railroad to Voi, which is the chief station in the Taita District, where he spent two weeks exploring the Taita Hills. Many rare mammals were secured

in the forests on the summits of these high ranges. After leaving the Taita Mountains he continued down the Uganda Railroad to the station of Maji-ya-chumvi in the Tarn Desert, a region very little known owing to its dryness and lack of game animals. Many small mammals were secured, most of which were new to the national collection. Another month was spent in the moist coast belt, which has quite a distinct fauna from the Tarn Desert or the highlands.

At the beginning of 1912 collections were made in the Kakumega Forest which lies on the northeast side of the Victoria Nyanza. It represents the easternmost extension of the Congo Forest, which pushes its way across Uganda and along the northern shore of the Victoria Nyanza to the Kakumega district. A great many Congo mammals were secured here, the most remarkable forms being the sloth-like tailless lemur, the Congo forest duiker, the Congo Colobus monkey, and several rare forest monkeys. Mammals and reptiles were found very abundant in the forest, and great numbers of specimens were preserved.

The zoölogical work done by the expedition added about a dozen genera and many species to the National Museum, and supplemented the work done by the Smithsonian African Expedition to an important degree. The described new species number about forty. Many new facts concerning the distribution of animals were secured by the exploration of new fields which was made possible by Mr. Rainey's liberality. In all, some 4,000 specimens of mammals were secured. Of these about 400 are large or may be counted as "big game." Birds were collected only in the unexplored territory, but the collection consists of some 400 specimens. The reptiles number more than 1,000, and the landshells are about equally numerous. Some 200 specimens of plants were also collected as accessory material in the study of the distribution of the fauna. The gathering of so large a collection was made possible through the large corps of native assistants which was furnished Mr. Heller by Mr. Rainey.

THE SMITHSONIAN EXPEDITION TO ALGERIA FOR THE STUDY OF THE HEAT OF THE SUN

Mr. C. G. Abbot, director of the Smithsonian Astrophysical Observatory, was engaged for five months in an astronomical expedition to Bassour, Algeria, with the object of confirming or disproving the supposed variability of the sun. The Astrophysical Observatory has been for seven years making observations on Mt. Wilson, in

California, on the daily quantity of solar heat. The observations are arranged in such a manner as to indicate not only the quantity of solar heat reaching the earth, but also the quantity of heat which would reach a body with no atmosphere, like the moon.

So far the observations have indicated that the sun is probably a variable star having a range of variation amounting to from five to ten per cent within an irregular interval of from five to ten days.



FIG. 14.—Mr. Angström and the solar-constant apparatus at Bassour.
 Photograph by Abbot.

In 1911 Mr. Abbot, assisted by Prof. F. P. Brackett, observed in Algeria, while his colleague, Mr. Aldrich, observed on Mt. Wilson, in California. The object of thus duplicating the measurements was to avoid any errors due to local atmospheric conditions which might have affected Mt. Wilson observations. As nearly one-third of the circumference of the earth lies between Mt. Wilson and Bassour, it could not be expected that a similar local disturbance could affect both stations at the same time and in the same manner. The observations of 1911 strongly supported the belief that the sun is variable, but owing to cloudiness their number was not sufficient to fully

establish this point. Hence, it was thought best to return to Algeria in 1912 for further data.

In this expedition Mr. Abbot was assisted in Algeria by Mr. Anders Knutson Angström, of Upsala, Sweden.

The observations made by the Smithsonian party in Algeria in 1912 were on the whole very satisfactory. They occupied 64 days, and on more than 50 of these days Mr. F. E. Fowle made similar



FIG. 15.—River scene at M'Sila, Algeria, an oasis of the Sahara.
Photograph by Abbot.

observations on Mt. Wilson, in California. Much volcanic dust from the eruption of Mt. Katmai in Alaska, June 6 and 7, 1912, was diffused in the upper atmosphere, and greatly reduced the intensity of solar radiation observed at both stations. Many otherwise excellent days were spoiled by it. However, it did not prove fatal to the success of the expedition.

The results of the work of 1911 and 1912 thoroughly establish the supposed variability of the sun.

ANTHROPOLOGICAL RESEARCHES ON ST. LAWRENCE ISLAND,
ALASKA

In the month of April, 1912, Dr. Riley D. Moore proceeded to St. Lawrence Island on behalf of the Panama-California Exposition



FIG. 16.—A portrait of "Koringoktikuk" (something gathered together) and child, showing the usual method of carrying children. Photograph by Moore.

of San Diego and the National Museum, the necessary funds being furnished by the former. The expedition work was planned by Dr. Aleš Hrdlička, curator of the Division of Physical Anthropology of



FIG. 17.—Summer home of Oghoolki. Walrus meat drying on the storage rack to the left. The bead in Oghoolki's hair is a sign of mourning. Photograph by Moore.



FIG. 18.—Three "strong men" of St. Lawrence Island, and the rocks they practice lifting. Photograph by Moore.

the National Museum, and the success of the undertaking was materially increased through courtesies extended by the Treasury Department and the Bureau of Education. Dr. Edward O. Campbell, a former teacher on St. Lawrence Island, also gave valuable advice regarding necessary supplies and equipment.

The journey from San Francisco to the island was made on the U. S. Revenue Cutter *Bear*. Iliuliuk, on the island of Unalaska, was the first stop, where the cutter remained for several days to clean boilers, thus permitting some measurements and observations of the natives. Later, visits were made to the Eskimo villages at Nome and St. Michael, and the graveyard near a deserted village on Golovin Bay was examined.

While lying at anchor in the Nome roadstead, word was received that two ships were caught in the ice off the Yukon Flats, and it was necessary to go at once to their relief. They were, however, cut of the ice before the arrival of the *Bear*. While cruising about to learn the condition and extent of the ice, a radiogram brought the information that Kodiak was buried under four feet of volcanic ash and that the wireless telegraph station at Wood Island had been destroyed, and presently orders were received to proceed at once to Kodiak.

At a distance of two hundred miles from the scenes of disaster the *Bear* began to pass through large fields of volcanic ash, many acres in extent, which covered the ocean like a thick greyish-yellow cream. At Karluk, on the northwest coast of Kodiak Island, the deposit of ash was approximately a half inch in depth, but at the village of Kodiak, on the east shore of the island, there was a layer twelve to eighteen inches deep of very fine volcanic dust.

After remaining at Kodiak about three days the party returned to the Island of Unalaska where a stay of nearly a week made further researches possible. The vessel then proceeded to St. Lawrence Island, which was reached July 1, sixty-five days after taking ship at San Francisco.

This island is situated in the northern part of Bering Sea about forty miles from the Siberian coast which was plainly visible on the few clear days during the summer. The average summer temperature is about 40° Fahrenheit, and on the warmest day the past summer was 54°.

Work was started on July 6, and proceeded smoothly, though not always as rapidly as was desired, for nothing could induce these easy going Eskimos to hurry or to keep an appointment.

During the four months sojourn on St. Lawrence, considerable data of anthropometrical, physiological, and ethnological interest were obtained, besides plaster masks and photographs of men and women. Detailed accounts of religious, funeral, and other ceremonies, and a large collection of folk tales were also procured.

HUNTING AND TRAPPING ON THE ALASKAN-CANADIAN BOUNDARY

Mr. Copley Amory, Jr., of Cambridge, Massachusetts, a collaborator of the National Museum, accompanied the Coast Survey



FIG. 19.—Joe Creek, tributary of the Firth River. Photograph by Amory.

party which was engaged in surveying the Alaskan-Canadian boundary in the summer of 1912. He reached New Rampart House on July 11, and with a trapper and three dogs, packed over the mountains for 60 miles to the base of supplies on the Old Crow. He then went north to Joe Creek, a tributary of the Firth. After two weeks he returned to Old Crow and was joined by Mr. Thomas Riggs, Jr., with whom he travelled some 40 miles to the southwest in the caribou country, returning to the station on the Old Crow on August 23. There a canvas boat was built and a trip was made down to the mouth of the river, a distance of about 300 miles.

Mr. Amory obtained about 60 mammal skins, including a series of caribou, and also 30 bones of fossil mammals, among which was a camel-like ungulate.¹ He made observations on the distribution of



FIG. 20.—Leaving Rampart House, July 11, 1912. Photograph by Amory.



FIG. 21.—Crossing the headwaters of the Firth River a few miles from the Arctic divide on the Alaska-Yukon boundary. Photograph by Amory.

various species, including caribou, beaver and other rodents, foxes, wolves, weasels, etc.

¹This specimen, which proved to be a Pleistocene camel, is described by Mr. James W. Gidley in *Smithsonian Misc. Coll.*, Vol. 60, No. 26, 1913.

GEOLOGICAL EXPLORATION IN THE CANADIAN ROCKIES

In continuance of his investigation of the Cambrian geology in the main range of the Rocky Mountains of Alberta and British Columbia, Canada, Dr. Charles D. Walcott, Secretary of the Smithsonian Institution, visited the region of the Yellowhead Pass, through which two great transcontinental railway lines, the Grand Trunk Pacific, and the Canadian Northern, are now building toward the Pacific coast.



FIG. 22.—Kodak view of Phillips Mountain with the névé and ice of Chushina Glacier, which extends down the slopes a mile where it overhangs the drainage line from Snowbird Pass. Photograph by Walcott, 1912.

After outfitting at Fitzhugh, east of the Yellowhead Pass, on the line of the Grand Trunk Pacific, the party crossed over the Pass on the Continental Divide and turned north from the line of the railway at Moose River, 17 miles west of the Pass. The Moose River was followed up to its head in Moose Pass, and a camp made at the head of Calumet Creek, which is a tributary of the Smoky River. The farthest camp out was made at Robson Pass, between Berg and Adolphus Lakes. Side trips were made from two camps in Moose

River valley, the Moose Pass camp and the Robson Pass camp. Many fine photographs were secured, and a reconnaissance section made of the great block of Cambrian and Ordovician strata from which the mountains of this region have been formed by uplift and erosion.

The most beautiful scenery was met with in the vicinity of Robson Peak. From a point 1,800 feet above the Robson Pass camp, one of the most interesting and superb views is obtained (fig. 27). The



FIG. 23.—Kodak view of a storm gathering over the Robson massif. In the foreground Smoky River flowing out of Lake Adolphus. Above the latter Robson Pass and then Berg Lake. The three glaciers Hunga, Blue, and Chupo, are seen in profile on the left. Photograph by Walcott, 1912.

horses in the photograph are near the edge of a cliff overlooking and rising 1,700 feet above the lake. Robson Peak rises cliff on cliff from the lake 7,000 feet (2,136 meters) to the summit, where the vapors from the Pacific gather nearly every day of the year. On the western side the slope is 8,800 feet (2,679 meters) from the summit to the floor of the valley above Lake Kinney. On the east and southeast the upper 3,000 feet are very precipitous, but below the slope is more gentle, forming the névé of the great Hunga (chief) Glacier. One of the

remarkable features of Robson Peak on the north is Blue Glacier. It is two miles in horizontal distance, and 7,000 feet in vertical fall between the snow cornices of Robson Peak and the foot of the glacier where the ice breaks off to float away as small bergs. Blue Glacier is a wonderful stream of falling, shearing, blue, green, and white ice. As seen in figure 24 the details of its marvelous descent are finely shown.

Iyatunga Mountain and Titkana Peak form the gateway to the great Hunga Glacier which is literally a river of ice. In figure



FIG. 24.—Kodak view of Blue Glacier, with Robson Peak concealed by mist. Photograph by Walcott, 1912.

27 three miles of its lower length is shown; the upper part is exhibited by figure 28, where the gathering fields of snow are seen on the slopes of Robson Peak and Mount Resplendent, and below the flow of the glacier over the cliffs where it merges into the broad river-like extension below.

The geological section was measured from Moose Pass (figure 30) southwestward over Tah Peak, Mount Malito, Titkana Peak, and across by Phillips Mountain and the ridges of Lynx Mountain to Robson Peak.

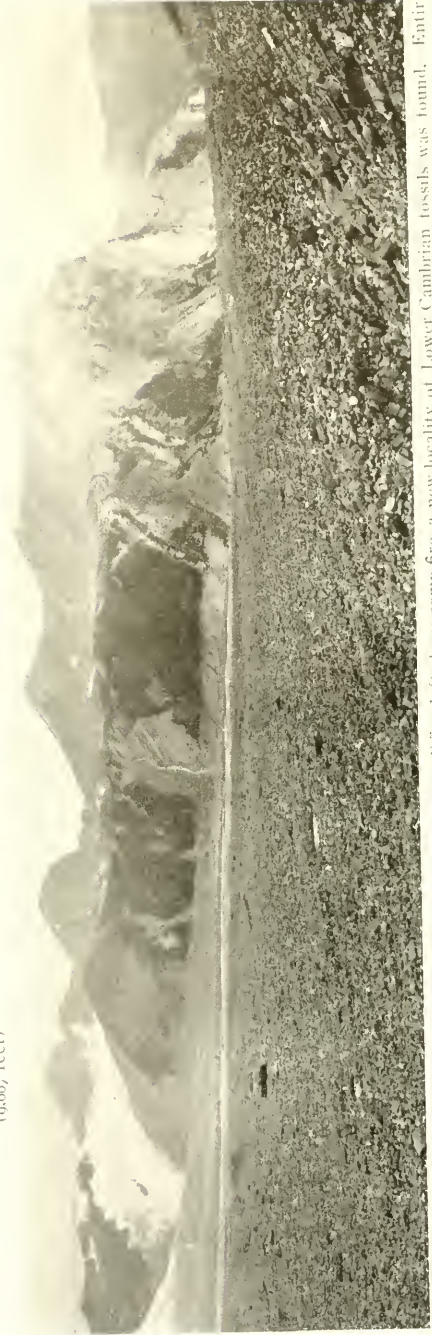


Glacier covered with rock debris.

Chapa
Point

Shota
Mountains

Mt. Gendarme
(9,697 feet)



FIGS. 25 and 26. Panoramic view of Maral Glacier. In lower cliff to left above camp-fire, a new locality of Lower Cambrian fossils was found. Entire



Robson Pass (5,500 feet)
 Fig. 27.—Panoramic view of the Robson massif, from a point on the ridge south of Mumm Peak.



Fig. 28.—Panoramic view of the Robson massif and adjoining mountains; great Hunga Glacier in foreground. Taken from point nearly opposite

Chushina Phillips Mt. Lynx Mountain ML Respicade at Moose River Billings Glacier Unken Glacier



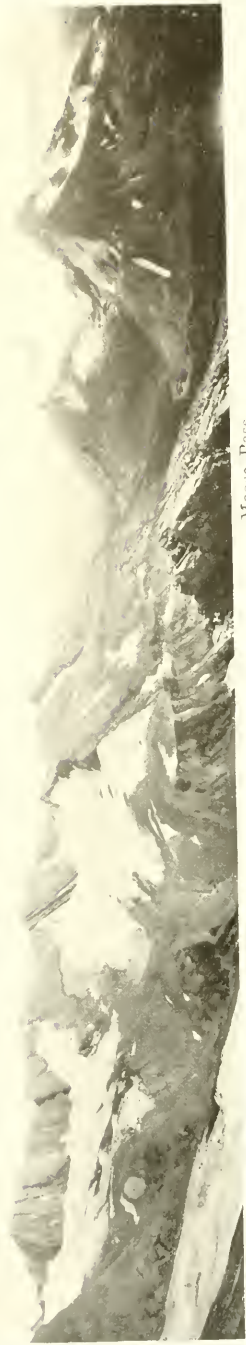
FIG. 29.—Panoramic view in continuation eastward of Fig. 28, showing almost the entire section of the Upper Cambrian rocks.

Paha Point

Tokana Mountains

Moose River Valley

Tah Peak



Moose Pass

FIG. 30.—Panoramic view of Moose Pass. The strata of mountains on the right of the Pass are of Lower Cambrian age, and those on the left of Upper Cambrian age. A fault line with a throw of about 9,000 feet has thrust the Lower Cambrian over the Upper Cambrian on the line of the Pass. Photographs by Walcott, 1912.



FIG. 31.—Surface of Hunga Glacier where the stream flowing over the ice parts so that the branch flowing to the left of the young man (Sidney S. Walcott) goes out to Berg Lake and thence to the Pacific, and that on the right to Lake Adolphus and the Arctic Ocean. At this point the Continental Divide is a hummock of ice upon which the man is standing. Photograph by Walcott, 1912.



FIG. 32.—An outdoor bed-room in the Canadian Rockies. Photograph by Walcott, 1912.

The stratigraphic section was found to contain approximately 12,000 feet of Cambrian rocks and 3,000 feet of Ordovician, the transition between the two systems of rocks occurring in Billings Butte (figs. 28, 29), which projects upward beside Hunga Glacier. At the northern base of Mumm Peak (figs. 25, 26), above Mural Glacier a new sub-fauna of the Lower Cambrian was discovered, the fossils being beautifully preserved.



FIG. 33.—Harry H. Blagden and Sidney S. Walcott preparing ptarmigan skins for shipment to the Smithsonian Institution. Photograph by Walcott, 1912.

Dr. Walcott was accompanied by Mr. Harry H. Blagden, of the Smithsonian Expedition of 1911, and his son Sidney S. Walcott. The two young men secured a number of fine mammal skins, which have been added to the collections of the National Museum. The collections of the Museum were also enriched by a fine series of fossils from the Burgess Pass quarry, reference to which was made in the report on the expeditions of the Smithsonian Institution of 1910 and 1911 (Smithsonian Miscellaneous Collections, Vol. 59, No. 11, pages 39-43).

FIELD-WORK OF THE BUREAU OF AMERICAN ETHNOLOGY
IN 1912

ETHNOLOGICAL INVESTIGATIONS OF DR. J. WALTER FEWKES IN THE WEST INDIES

One of the most important and interesting lines of research conducted by the Bureau of American Ethnology is that which has been under the immediate supervision of Dr. J. Walter Fewkes, for many years an ethnologist in the Bureau, who has conducted important investigations on the archeology of the West Indies.

The need of making a comprehensive study of the archeology of the West Indies in order to determine the position of the original inhabitants of those islands among the American aborigines was realized several years ago, and the investigation of this field was assigned to Doctor Fewkes who prepared several papers on the results of his work, including "Aborigines of Porto Rico and Neighboring Islands," published in the Twenty-fifth Annual Report of the Bureau. Subsequently Doctor Fewkes's attention was diverted to other fields, but last year Mr. George G. Heye made it possible to resume research in the West Indies, and in October Dr. Fewkes sailed for Trinidad, after spending some time in New York City for the purpose of studying the noteworthy collections of West Indian objects in the Heye museum. On his arrival in Trinidad, Doctor Fewkes made an examination of certain caves near Port of Spain, but found no indication of former troglodytes (cave dwellers). At Erin, a hamlet of French negroes, he found a large shell-heap, the contents of which indicated a high development of the aboriginal occupants, especially in the manufacture of pottery. This pottery has relief decorations, and is painted red, while one of several entire vessels is decorated with incised figures. Doctor Fewkes also recovered about a hundred animal heads of clay, some of which are well modeled, together with typical stone axes and other utilitarian objects.

As objects adequately illustrating the artistic ability of the prehistoric inhabitants of Trinidad are unknown in the museums of Europe or the United States, the collection of beautiful pottery made by Dr. Fewkes in the shell heaps at Erin, opens a new chapter in the history of West Indian culture and immigrations. While it is yet too early to interpret the bearing of these objects on our knowledge of the culture of the prehistoric people dwelling about the Caribbean Sea, it is evident that the prehistoric culture of this island is closely allied to that existing in ancient times on the neighboring coast of Venezuela and quite distinct from the so-called Carib of St. Vincent, Grenada

and the more northern islands. The indications are that the people who made the shell heaps at Erin were not Caribs, but belonged to a stock allied to that of prehistoric Porto Rico of which there were several subdivisions in the West Indies.

Detailed reports of Doctor Fewkes's excavations have not been received in time for incorporation in this article, but to judge from the results obtained during the short period spent in Trinidad prior to the time his report was received, there is every prospect that the study will meet with great success, both from the point of view of subjective material and in collections obtained. At last account, Doctor Fewkes had departed for St. Vincent for the purpose of continuing his studies.



FIG. 34.—A Delaware meeting house, near Copan, Oklahoma in which the Annual Ceremony, the most sacred institution of the Delawares, is held. Photograph by Michelson.

OBSERVATIONS ON THE FOX INDIANS OF IOWA, AND OTHER TRIBES, BY DR. TRUMAN MICHELSON

In January, 1912, Dr. Michelson visited the Carlisle non-reservation Indian School to obtain information on several Algonquian languages, and in July went among the Fox Indians at Tama, Iowa, from whom a large body of mythological data was obtained. The notes made during this season and the preceding one cover some seven thousand pages. When completely translated, it will make available one of the most exhaustive collections of the mythology of any American Indian tribe. It is noteworthy that these tales differ stylistically from those gathered by the late Dr. William Jones, and this fact helps to bring out more clearly how necessary it is that all

myths should be collected in the original Indian language. The tales collected are exceedingly important in showing the dissemination of myths.

Work was also continued on the social and ceremonial organization. Especially full notes were obtained on the Religion Dance.



FIG. 35.—A Fox woman and her husband. He is one-quarter Fox, one-quarter Potawatomi, and one-half Winnebago. Photograph by Michelson.

All the songs of one of the drums were recorded on a dictaphone, as were some of a second drum. Several photographs of a ball game, were obtained and it is probable that photographs of other ceremonies may be had later.

On leaving Tama, Dr. Michelson proceeded to the non-reservation Indian school at Lawrence, Kansas (Haskell Institute), for the purpose of obtaining notes on several Indian languages.

After a brief stay there, he went among the Munsee of Kansas, where some new information regarding the language was obtained. He then visited the Delaware Indians of Oklahoma, and was gratified to find that many of their ancient customs were preserved almost intact. Elaborate notes were taken of several dances, and observations on the social organization were made.



FIG. 36.—Fox Indians about to start the ball-game, Tama, Iowa. Photograph by Michelson.

On his return east, he stopped at Tama, Iowa, to obtain additional notes on the Fox Indians, as well as to arrange for the purchase of some of their sacred packs, in which work he was successful.

STUDIES OF THE TEWA INDIANS OF THE RIO GRANDE VALLEY BY MRS. M. C.
STEVENSON

Mrs. M. C. Stevenson, who is making a comparative study of the Pueblo Indians, devoted much time in 1912 to investigations into the life of the Tewa people of the Rio Grande valley. She finds that these Indians hold tenaciously to their peculiar beliefs and rituals. Like the Zuñi, they believe in a supreme life-giving power, the symbol and initiator of life and life itself, pervading all space, and called by them "Wowayi." This superior power is the sky. The Tewa conception of this supreme power is similar to the Grecian conception of Athena, and identical with the Zuñi and Taos belief.

The Tewa have religious associations with every mountain peak surrounding them. The most sacred, except Sierra Blanca, is Tsi'komo, or "loose rock," which is a day's journey on foot from San Ildefonso Pueblo. There is a shrine on the summit of the mountain and a large tree trunk is planted and firmly supported by a mound of rock, as a token that Tsi'komo is the greatest of all mountains, except Sierra Blanca, and is the companion of this great peak in southern Colorado.

One of the most interesting ceremonies associated with the moun-

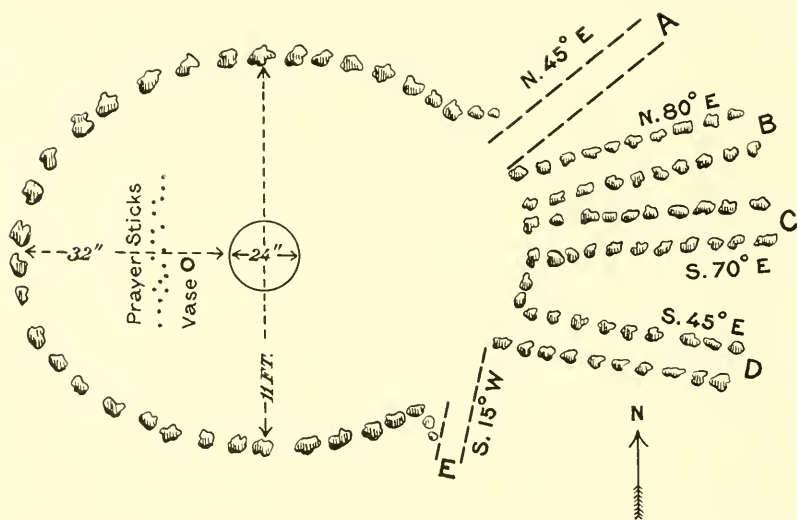


FIG. 37.—Shrine on Mt. Tsi'komo, showing circle of stones, lines of trails to pueblos, vase and prayer-sticks.

tain Tsi'komo is the voluntary initiation of the youth into the fraternities in the kiva, or ceremonial chamber.

Like the Taos, the Tewa are divided into Sun and Ice people. Each group has a kiva, and there is a third room for the accommodation of both parties.

After the initiates and priests have spent four days and nights in the kiva, they make a pilgrimage to the mountain Tsi'komo. Upon reaching a spring far up on the mountainside the party rests for refreshment, which consists only of wafer-like bread. After the repast, the rain priest with his associates, and the elder and younger bow priests, ascend to the shrine where the ceremonies are

conducted. Space will not permit a detailed account of the ceremonies of this ancient ritual.

There is perhaps not a man among the Tewa who can boast of having taken a scalp, but the bow priesthood, or fraternity of warriors, survives, since this organization has important duties to perform aside from going to battle and taking scalps. One of these is to conduct the celebration of the feast of the harvest which occurs only when the people are blessed with bountiful crops, for the cere-

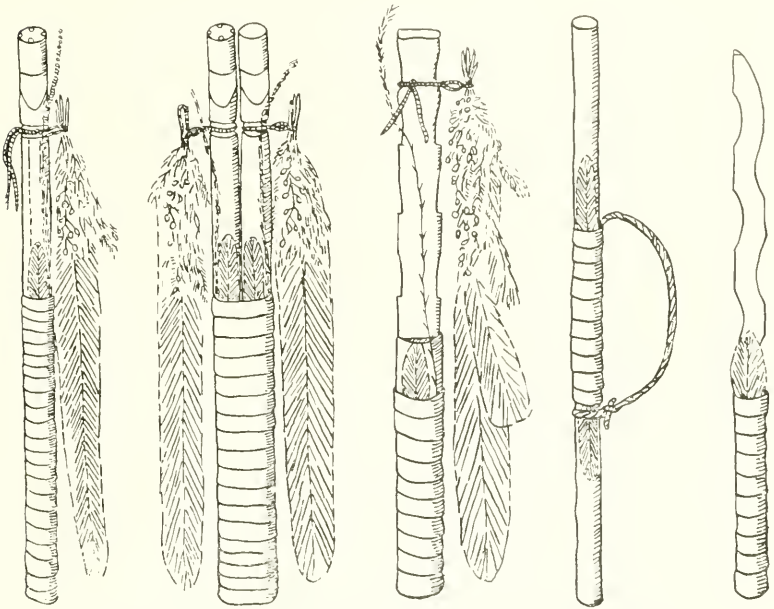


FIG. 38.—Prayer-sticks used in the shrine on Mt. Tsi'komo.

mony is a rejoicing over the harvest of plenty. The dance on this occasion is called the "throwing out." Gifts are thrown in great profusion by the dancers to the populace as evidence of the prosperity of the people.

Another purely aboriginal dance of the Tewa is a dramatic representation of the huntsmen returning with game, and is called the buffalo dance. It includes extremely attractive impersonations of buffalo, deer, and antelope. The costumes are most elaborate. This feast usually occurs on the twenty-third of January, but occasionally it is omitted, as was the case in the present year.



FIG. 39.—Harvest Dance of San Ildefonso. Photograph by Mrs. Stevenson.



FIG. 40.—Harvest Dance of San Ildefonso. Photograph by Mrs. Stevenson.



FIG. 41.—Buffalo Dance, showing Indians representing deer, antelopes, and buffaloes. Photograph by Mrs. Stevenson.



FIG. 42.—Indians executing the Buffalo Dance; San Hdefonso. Photograph by Mrs. Stevenson.



FIG. 43.—Eagle Dance. Photograph by Mrs. Stevenson.



FIG. 44.—Eagle Dance. Photograph by Mrs. Stevenson.

The most graceful figures ever observed by Mrs. Stevenson among any people are those of the eagle dance. Two men impersonate eagles, and the songs are sung by a choir which follows the dancers. The first song refers to the spotted mesa, the second to the white elk, the third to the white eagle, and the fourth to the black eagle.



FIG. 45.—Eagle Dance.
Photograph by Mrs. Stevenson.

INVESTIGATIONS AMONG THE INDIANS OF OKLAHOMA AND TEXAS BY DR. JOHN
R. SWANTON.

From January to May, and again in November and December, 1912, Dr. John R. Swanton was engaged in researches in Oklahoma and Texas. In March he visited a number of places in Texas in the hope of finding remnants of the numerous small Indian tribes that originally lived, or were temporarily located, in various parts of that State. Some information was obtained regarding the fate of the

Bidai Indians of Grimes and Montgomery counties. During the same trip a considerable body of ethnological information and a number of texts were added to what had been collected from the Alabama



FIG. 46.—Sweat house at Chiaha busk ground, Seminole Co., Oklahoma.
Photograph by Swanton.



FIG. 47.—Pakan talahassi busk ground, near Hanna, Oklahoma.
Photograph by Swanton.

Indians of Polk County, Texas, in 1910. In May he also visited one of the four surviving speakers of the Natchez language, near Braggs, Oklahoma, and added considerably to the material, ethnological and

philological, collected there in 1908 and 1910. He now has about 260 manuscript pages of text, besides a large vocabulary of this rapidly dying language.

In the fall Dr. Swanton visited the Alabama Indians again, made further ethnological investigations, and recorded many pages of texts in the Alabama and Koasati languages, besides correcting some which had been previously taken down. A short trip was also made at this time to the Caddo Indians to determine the number of dialects still spoken among them. It was learned that the only two still in use are Nadako and Kadobadacho, which vary very little, although



FIG. 48.—West cabin, Chiaha busk ground. Photograph by Swanton.

considerable is remembered of Natchitoches, and a number of Natchitoches words were recorded. In December he began recording texts in the Hitchiti language, formerly spoken over most of southern Georgia, but now represented by only 20 or 30 speakers among the Creeks and Seminoles of Oklahoma, besides a few Seminoles still in Florida. Among the Creek Indians proper, most of his time was devoted to an investigation of the ancient town and clan organizations, especially as those were represented in the annual "green corn dance" or "busk." Of the 40 or 50 towns originally constituting the Creek confederacy and observing this ceremony, 12 still carry it out in some form or other, but it is scarcely more than a shadow. Nevertheless, with the help of those old men who can remember the ceremonials as they existed before they were broken up by the

internal troubles incident to our Civil War, it has been possible to add a great deal to our knowledge of the ancient Creek confederacy.

STUDIES AMONG THE OSAGE INDIANS BY MR. FRANCIS LA FLESCHÉ

During the year 1912 Mr. Francis La Flesché continued his ethnological studies among the Osage Indians, and his search for articles illustrative of their past life, for preservation by the Smithsonian Institution.



FIG. 49.—Sacred Osage pack. Photograph by Bureau of American Ethnology.

Before contact with the white race, the Osage Indians maintained a tribal organization, and the story of the means agreed upon for its conservation has been transmitted in rituals, songs, and ceremonies, and in certain articles consecrated for use in tribal rites. These rituals, songs, and dramatic acts had to be kept in their original sequence without variation, and a ceremony frequently requires from 18 to 20 hours of continuous effort on the part of the officiating priest.

Among the articles consecrated for use in the tribal rites are two that are regarded by the Osage Indians as the most sacred and significant in their meaning. These are the "burden strap of the woman," and the "sacred bird-hawk of the man."

The Osage tribe is composed of two great divisions, one of which occupies the north side of the tribal encampment, and the other the south side. The divisions are made up of sub-groups, each of which has its part of the general story contained in the tribal rites, and also its sacred article which is kept in ceremonially prepared cases, making a "bundle."

Mr. La Flesche was so fortunate during his stay among the Osage Indians in 1912, as to obtain for the Institution seven specimens of the sacred burden straps, some of which are very old and made of buffalo hide, having been handed down as heirlooms. He also obtained three of the sacred "bundles," one of which is of peculiar interest.

The transferring of this "bundle" to Mr. La Flesche was accompanied by a scene which gave evidence of the reverence with which these ancient and sacred objects are still regarded. Although, in this particular instance, the keeper of the "bundle" and his wife have abandoned the customs and religion of their forefathers and have accepted a new faith, yet the act of parting with this relic of the past awakened the memory of former beliefs in its power for good and ill. When about to give up the "bundle," the wife of its keeper took it outdoors and, standing in the early sunlight, lifted the ancient object to the sun, and while holding it aloft uttered a prayer for its safety, at the same time making an appeal that no harm should befall her household for her act in surrendering forever a sacred charge.

OBSERVATIONS ON BIRDS AND THEIR NESTS, IN NEWFOUNDLAND AND LABRADOR, BY MR. A. C. BENT

Mr. A. C. Bent spent the months of June, July, and August, 1912, in Newfoundland and Labrador, for the purpose of gathering further information and material for the work on the life histories of North American birds, of which the Smithsonian has issued two volumes. During the first month he travelled alone or with a guide, in Newfoundland. A week was occupied in visiting Dr. Leonard C. Sanford's camp on the west coast of the Fox Island River, where he collected a series of crossbills which proved to be a new sub-species.

Mr. Bent then explored the so-called mountains near Gafftopsail in central Newfoundland, a desolate, barren, rocky region, including the highest land on the island, the breeding ground of ptarmigan and greater yellowlegs. He also explored the Humber River, below Deer Lake, visited Grand Lake, collecting about the north end, and spent a week exploring the Sandy River region, including Little Deer Lake and Sandy Lake, which is heavily timbered and good bird country. A number of water birds, such as loons, glaucous and great black-backed gulls, mergansers, and golden-eyes were found



FIG. 50.—Okak, Labrador. Photograph by Bent.

breeding in this region, as well as various interesting forest-loving species of land birds. The remainder of the time, until July 3, was spent in collecting land birds about Bay of Islands.

The trip to Battle Harbor, Labrador, was made by steamer, where the rest of the party, consisting of Mr. Donald B. MacMillan and Mr. J. C. Small, was found waiting with a small power launch. A short run was made southward to St. Peter's Bay to visit some breeding colonies of eiders and other sea birds, after which the party started northward and explored the whole coast, somewhat hurriedly, of course, as far north as Cape Mugford, beyond Okak.



FIG. 51.—The Labrador coast. Photograph by Bent.



FIG. 52.—Ancient Eskimo grave, Okak, Labrador. Photograph by Bent.

Some little time was spent near Hopedale, ten days on the way down and a week on the return trip. A trip was also made inland for a distance of thirty-five miles, and some of the outer islands were visited.

The sea birds on the Labrador coast have been sadly reduced in numbers by many years of constant persecution and persistent eggging. The Alcidae have nearly all disappeared, except the black guillemot,

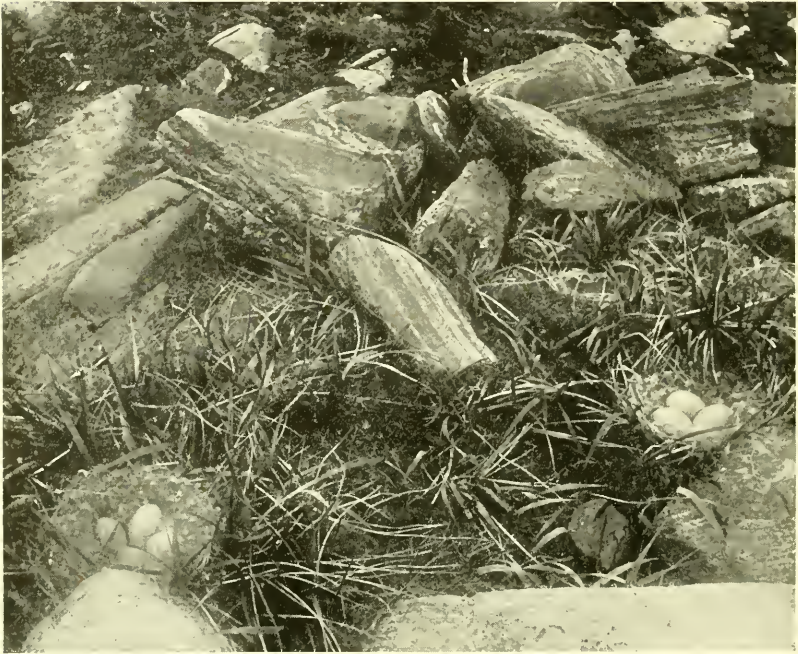


FIG. 53.—Nests of Northern Eider, Labrador. Photograph by Bent.

which lays its eggs in inaccessible crevices in the rocks. Eiders are still locally common, but are rapidly disappearing; only one large breeding colony was found. Scoters are still abundant in large flocks about the heads of the bays.

Glaucous gulls still breed on the high rocky cliffs where their nests are inaccessible. Great black-backed gulls and herring gulls are still fairly common. Land birds are nowhere abundant, with the possible exception of the white-crowned sparrow, which is a common dooryard bird everywhere. Horned larks, pipits, juncos, Labrador jays, tree sparrows, and redpolls are fairly common.

A NEWLY-DISCOVERED CAVE DEPOSIT NEAR CUMBERLAND,
MARYLAND

In October, 1912, Mr. J. W. Gidley, assistant curator of fossil mammals, in the National Museum, made a preliminary examination of some cave deposits containing bones of Pleistocene age near Cumberland, Maryland, which had previously been discovered and reported by Mr. Raymond Armbruster, a citizen of Cumberland.



FIG. 54.—South side of railroad cut, near Cumberland, Maryland, showing upturned ledge of Heldebergian (Devonian) limestone, partly covered with stalactitic material; bone-bearing deposits seen at base. Photograph by Gidley.

The results were very satisfactory considering the limited time available, upwards of a hundred specimens being secured representing about 24 species of mammals, most of them either extinct or now living only in localities very remote from the mountains of Western Maryland.

The fauna proves very interesting, and the "find" promises to be most important in that it will throw much additional light on our knowledge of the Pleistocene mammals of the eastern United States, or, in other words, those immediately preceding the existing

ones. Among the objects of especial interest collected are a few fragmentary jaws representing a new species of dog as large as the largest living wolves, but with more the character of the fox, or jackal; and a series of upper cheek teeth representing a large extinct species of antelope very closely related to the eland now living only in Africa and the largest of all the antelopes.¹ The deposits were not exhausted and it is intended to continue the examination as further exploration will doubtless add new treasures to the list.



FIG. 55.—Upper Ordovician shales, showing bedding and cleavage, Western Maryland Railroad, west of Williamsport, Md. Photograph by Bassler.

MAPPING THE GEOLOGICAL STRATA AND COLLECTING FOSSILS IN THE VALLEY OF THE APPALACHIAN MOUNTAINS

During the summer of 1912, Dr. R. S. Bassler, curator of paleontology in the U. S. National Museum, spent eight weeks in the Appalachian Valley of Pennsylvania, Maryland, and Virginia, in mapping the rock-strata and collecting fossils. The principal object of this work, which was under the joint auspices of the Maryland

¹ Mr. Gidley's description of this extinct American Eland is to be found in Smithsonian Miscellaneous Collections, Vol. 60, No. 27, March 22, 1913.

Geological Survey and the U. S. National Museum, was to obtain material for volumes on the Cambrian and Ordovician strata of Maryland, to form a part of the series of memoirs published by that State.

This work was done in such detail that it was possible to map the Hagerstown and Williamsport quadrangles of western Maryland, embracing all of the Appalachian Valley in that State. The various formations making up the great Shenandoah limestone series were

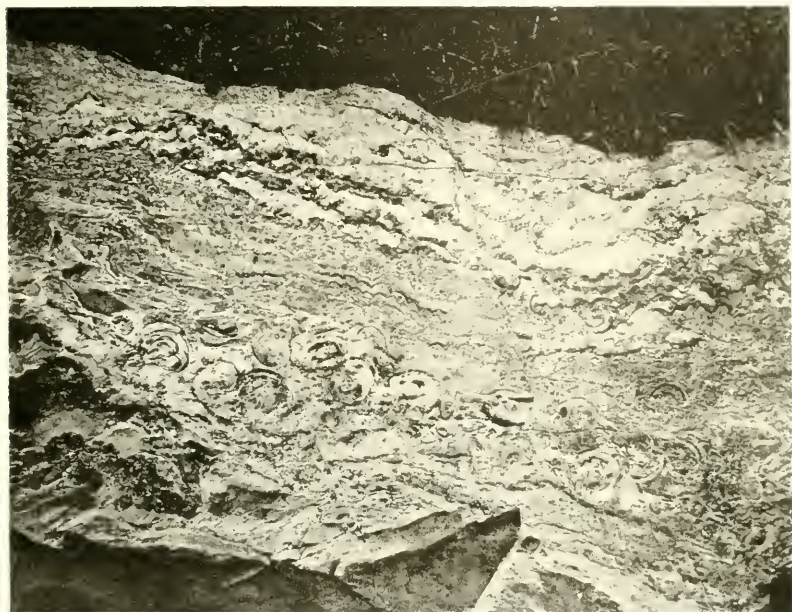


FIG. 56.—Fossil alga, *Cryptozoon*, exposed along the railroad near Antietam Station, Md. Photograph by Bassler.

first studied, with the result that eight distinct formations, aggregating 10,000 feet in thickness, were recognized and mapped. During the process of the mapping, large collections of both rocks and fossils, illustrating all the formations of the Shenandoah limestone, were obtained.

In addition, numerous photographs were taken, showing some of the more interesting features of the geology. Two of these are here reproduced. Figure 56 illustrates a reef of the hydrocoralline or calcareous alga, *Cryptozoon*, as shown on Antietam Battlefield. This reef may be noted wherever the base of the Upper Cambrian (Cono-

cocheague) limestone is exposed, and the rock crowded with rounded heads of *Cryptozoon* affords a unique building stone known as "bull's eye" marble. In figure 55 the cleaved condition of the Upper Ordovician slates illustrates the difficulty of securing well preserved fossils in such a formation, for, as shown here, the cleavage is at right angles to the bedding planes along which the fossils are to be found.

COLLECTING FOSSIL ECHINODERMS IN THE APPALACHIAN VALLEY AND IN MISSOURI

Important discoveries of fossil echinoderms, especially of those known as cystids and crinoids, were made during a long field season in 1912, under the direction of Mr. Frank Springer, associate in paleontology in the U. S. National Museum. Mr. Springer's private collector, Mr. Frederick Braun, started early in the season and made careful researches for crinoids in certain Ordovician formations of the Appalachian Valley which had hitherto received very little study. Localities in Virginia and Tennessee were thoroughly searched, resulting in the discovery of a number of new species and genera, especially of cystids. These are deposited in the National Museum and will form the subject of a monograph by Mr. Springer. Many of the other fossils of these formations were gathered at the same time and have been presented to the Museum by Mr. Springer.

Later in the summer Mr. Braun was detailed to examine certain Lower Devonian strata outcropping along the banks of the Mississippi just north of Cape Girardeau, Missouri, where crinoid stems had been previously noted associated with a peculiar bulb-like organism known as *Camarocrinus*. These bulbs had been considered as free floating organisms of an echinoderm nature, similar in habit to the recent jellyfish, and it was Mr. Springer's wish to ascertain if complete stalks of crinoids could not be discovered in connection with them. After a protracted search for miles along the bluffs facing the Mississippi River, Mr. Braun succeeded in locating the crinoid layer at an accessible point and carried on quarrying operations there for several weeks. The work resulted not only in the recovery of some of the most remarkable specimens of fossil crinoids ever obtained, but in settling finally the fact that *Camarocrinus* is only the bulbous root of the fine crinoid to which the name *Scyphocrinus* has been given in Europe. Four large slabs were obtained having an aggregate weight of 4,500 pounds. Two of these fit together so as to form a single slab 4 feet by 7 feet, and containing

the most important specimens. The locality being several miles distant from any station or landing, it was necessary after crating



FIG. 57.—Slab filled with remains of the very large Crinoid *Scyphocrinus elegans*. Found near Cape Girardeau, Missouri. Photograph by Springer.

the slabs to construct a chute by which they were lowered to the river's level from a rock levee about 35 feet in height. This was

done successfully and the slabs shipped safely to the National Museum, where they are now being prepared for exhibition in the hall of paleontology.

FIELD-STUDIES ALONG THE PATUXENT AND POTOMAC RIVERS,
CHESAPEAKE BAY, AND THE NORTH CAROLINA COAST

Collections of fishes for the National Museum were made during 1912 in the Potomac River and its tributaries from Plummer's Island to Mattawoman Creek, in branches tributary to the Patuxent



FIG. 58.—Power launch *Yorkspit*, and view across Mattawoman Creek, Maryland, one mile above Indian Head docks, a good collecting ground. Photograph by Bean and Weed.

River, and in Chesapeake Bay several miles south of Chesapeake Beach. They were made without expense to the Museum, for the most part by members of the Museum scientific staff while on leave of absence, and were mainly for addition to the exhibition series.

On a one day excursion to Mattawoman Creek, and nearby points on the Potomac, something like 450 specimens representing 26 species were collected. Included among these are specimens of black bass, white and yellow perch, darters, roach, shiners, silver sides, herring, young shad, mummychogs (bull or pike minnows), "spawn-eaters," "smelt" of the Potomac, common eels, catfish, little "mad toms," American sole or hog-choakers, sunfish, or "tobacco-boxes,"

and other varieties of sun-fish, namely, common, long-eared, and blue-spotted.

Several trips were made to Plum Point, on Chesapeake Bay, by Messrs. William Palmer and A. C. Weed, resulting in the collection



FIG. 59.—Mr. Wm. Palmer on the beach near Plum Point, Chesapeake Bay. Photograph by Weed.

of a number of interesting fishes common to the salt and brackish water of the region. Mr. Palmer also spent some time in digging for fossil cetaceans in the marl banks along the bay.

As in previous years, Mr. Ernest B. Marshall made very interesting collections in small streams tributary to the Patuxent, near Laurel, Md. Messrs. Bean and Weed participated in several of these

trips. Through the generosity of Mr. J. B. Peyton, Jr., the collecting parties were conveyed to various points along the Potomac River in his power launch *Yorkspit*.



FIG. 60.—Dorsal view of a Spotted Sting-Ray, and young, taken at Bight of Cape Lookout, N. C. Photograph by Coles.

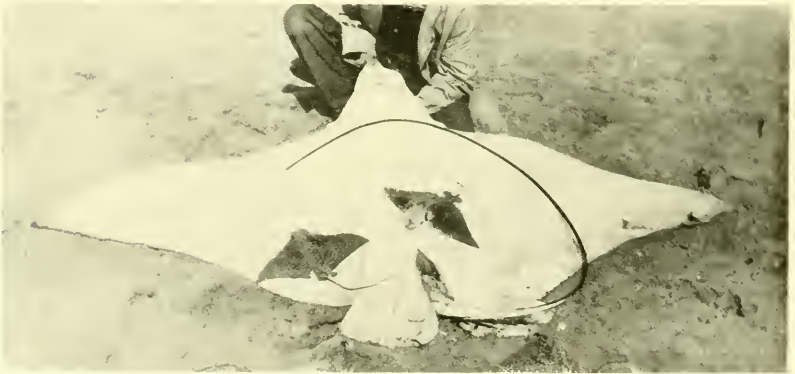


FIG. 61.—Ventral view of a Spotted Sting-Ray and young, taken at Bight of Cape Lookout by Russell J. Coles. Photograph by Coles.

Mr. Russell J. Coles, of Danville, Virginia, who made collections around Cape Lookout, North Carolina, sent to the Museum some very interesting fishes, and several photographs, among them an especially interesting picture of a large spotted ray and its young, (figs. 60, 61).



FIG. 63.—Preparing to haul a seine along the shore of Mattawoman Creek, one mile above the docks at Indian Head, Maryland. Photograph by Weed.

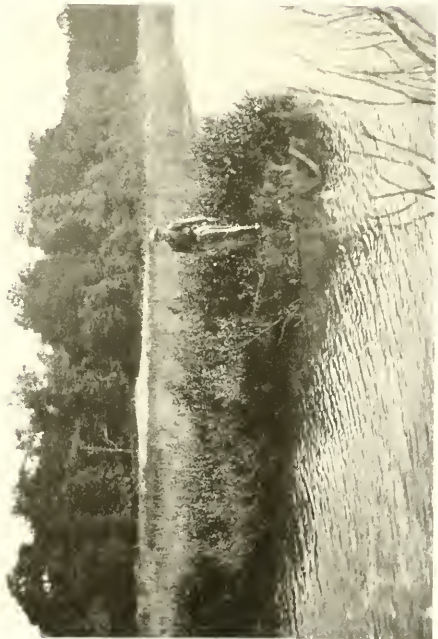


FIG. 62.—Parker Creek, about three miles south of Daré's wharf, Maryland, where specimens of fish were taken. Photograph by Weed.



FIG. 64.—Mr. Wm. Palmer digging for fossils on Chesapeake Bay.
Photograph by Gronberger.

OBSERVATIONS ON MOLLUSKS AMONG THE BAHAMA ISLANDS AND THE FLORIDA KEYS

On the invitation of Dr. Alfred G. Mayer, director of the Department of Marine Biology of the Carnegie Institution, Dr. Paul Bartsch of the National Museum joined an expedition on the steamer *Anton Dohrn* to the Bahama Islands, the main object being a study of the marine mollusks of that region in their natural surroundings, with special reference to the boring and nestling organisms associated with corals.

Incidentally a trip was made by motor boat up the Miami River, and along the Everglade drainage canal; as well as several visits to the off-lying keys. Collections were made in all these places and careful notes bearing upon faunal associations were taken upon all the material gathered. The region about Miami is extremely well suited for observations of this kind, as it presents many different

conditions in the narrow space between the main shore and the outer beach of the off-lying keys, each of which is occupied by a peculiar faunal assemblage.

On April 28, 1912, the party crossed the Gulf Stream and proceeded to Nassau, New Providence, where collections were made of living mollusks, and a fine series of the fossil mollusk, *Cerion agassizi* Dall, was obtained.

The party then went to Andros Island. Here the marine mollusks proved rather disappointing, there being but few species and these,



FIG. 65.—The laboratory, "White House," near Sharp Rock Point, Andros Island. Photograph by Bartsch.

as a rule, were few in number. The land shells were far more interesting, the genus *Cerion* in particular offering some most interesting problems.

Andros Island is a collective term applied to a whole host of minor keys that are separated by tortuous channels of varying width and depth. Practically every key examined, no matter how small, provided it bore vegetation, was found to be inhabited by *Cerions* of the *C. glans* group. The shells on each key present differences sufficient to enable one to distinguish them. For example, in size alone, 500 of those collected about Bastion Point filled a 3-pint measure, while the same number from the neighborhood of our temporary laboratory,

the "White House," near Sharp Rock Point, required a 5-pint measure to contain them. There are also other characteristics besides differences in size.

On account of the many puzzling phenomena regarding their distribution, it was thought desirable to gather large series of specimens of *Cerion* and associated mollusks for careful study and experimentation.

Of *Cerion* alone about 40,000 specimens were collected from as many localities as possible. This was done with the idea of intro-



FIG. 66.—Two races of Bahama shells (*Cerion*) planted by Dr. Bartsch on keys between Miami and Tortugas, Florida. Photograph by National Museum.

ducing some of them into other islands, so that the effect of a change of environment could be studied later.

The party returned to Nassau on May 26, and then set sail for Miami, where it remained until the end of the month. During this time a fine series of that most beautiful of all North American land shells, *Liguus*, was secured, as well as a goodly number of other species. A number of dredge hauls were made north of Cape Florida, in shallow water, by the *Anton Dohrn* and a fine series of marine invertebrates secured.

On May 31 the expedition sailed south for Key West. On this cruise, and during the stay at Miami, the two races of Bahama *Cerions* were introduced at different points.

During the cruise from Miami to Key West, a special effort was made to examine as many of the keys as could be reached conven-



FIG. 67.—One of the commonest shells on the Bahama eroded rock beaches, *Tectarius muricatus* L. Photograph by Bartsch.

iently for *Cerion incanum* Binney, and, wherever found, to gather as large a series as possible. It was observed that most of the keys

which had been flooded during the hurricanes of 1906 and 1910, contained practically no live Cerions, though dead ones were observed in a number of places, and this caused one to wonder whether sea-water might serve as a decided barrier to these forms.

Little is known about the life history of Cerions. They are remarkably variable, usually very restricted in their distribution, and very abundant where they occur. They are very tenacious of life, specimens having been kept in the U. S. National Museum for more than eight years; these occasionally leave the tray in which they are placed and seek a new resting-place. Cerions are also not particular about specific food, in fact they might be looked upon as "the goats" among the mollusca. They are furthermore not readily affected by changes in temperature. All these features indicate a remarkably desirable subject for investigation, and the hope is entertained that the various experiments to which they might be subjected will yield information enabling one to understand what is meant by the protean nature of this group.

During this cruise careful color notes on about 160 marine animals were made, which were found very desirable in retinting the specimens which are now being installed in the faunal marine invertebrate exhibit of the National Museum.

COMPLETION OF THE SMITHSONIAN BIOLOGICAL SURVEY OF THE PANAMA CANAL ZONE

In carrying on the biological survey of the Panama Canal Zone, inaugurated in 1910, the Smithsonian had the coöperation of several government bureaus, including the Bureau of Fisheries of the Department of Commerce and Labor; the Bureau of Entomology and the Biological Survey of the Department of Agriculture; the Isthmian Canal Commission, and the Panama Railroad Company, under the War Department, etc. The Field Museum of Natural History of Chicago also took part in the investigation of the fish faunas.

The field-party for 1912 included Mr. E. A. Goldman, of the Biological Survey, Mr. August Buseck, of the Bureau of Entomology, and Dr. Charles D. Marsh, of the Bureau of Plant Industry, all of the Department of Agriculture; also Professor H. Pittier, of the same Department, who remained in the field during nearly the whole period of the survey. Dr. Seth E. Meek represented the Field Museum, and Mr. S. F. Hildebrand, the Bureau of Fisheries.

The first party sailed from New York on the *Panama* on January 9, 1912, and arrived at the Canal Zone January 15, whence the different members departed for their respective collecting grounds.

Arriving at Empire in the middle of January, Mr. E. A. Goldman immediately began collecting mammals, and on February 21 went to Real de Santa María in Eastern Panama, where he endeavored to determine the faunal relations of this region with the Canal Zone



FIG. 68.—Cara, eastern Panama, headquarters of the Darien Gold Mining Co. Used as the base of field operations in the Pirri mountains. Photograph by Goldman.

and the areas lying to the westward and northward. His efforts were centered around the Pirri Mountains, one of the highest ranges in eastern Panama, rising to a height of over 5,000 feet, and located near the Colombian boundary, southeast of San Miguel Bay. In this work he was most successful. The region is covered with a dense

unbroken forest and has a heavy annual rainfall, although at the lower levels it is usually dry from January to April, except for the almost constant fog. The collections secured by Mr. Goldman, which are deposited in the National Museum, include some 800 birds



FIG. 69.—Forest at 5,200 feet elevation, Pirri Mountains, eastern Panama; composed largely of palms and including many tree ferns. Photograph by Goldman.

and about 600 mammals. From the studies thus far made upon them, they appear to strengthen the view that the fauna of eastern Panama is South American in its general characteristics. Among them are many new forms, some of which have been described by Messrs. Goldman and Nelson in the Smithsonian Miscellaneous Collections.

Mr. Goldman returned to his headquarters at Empire, from Darien, in order to ship specimens, but again entered this region to complete his work in the lower elevations and remained there until early in July. During the time spent at Darien, Mr. Goldman states that his efforts were greatly facilitated and his expenses much reduced, through the aid rendered him by the Darien Gold Mining Company.



FIG. 70.—A part of the Pirri Mountains, eastern Panama, as seen from 1,800 feet altitude, in Cuna Valley. Photograph by Goldman.

Dr. Seth E. Meek, of the Field Museum of Natural History, and Mr. S. F. Hildebrand, of the Bureau of Fisheries, who again participated in the work of collecting and studying the fishes of the Zone, arrived at Cristobal on January 15, 1912, and commenced work almost immediately. During the previous expedition, the collecting was confined mainly to the fresh and brackish waters of the Canal Zone and the immediate vicinity, but on this trip most attention was devoted to the salt-water fauna. On the Pacific Coast this was carried on from three points—Panama, Balboa, and Chamé Point, and on the Atlantic coast from four different points—Cristobal,

Colon, Toro Point, and Porto Bello. Large collections were secured from both coasts.

Besides the salt-water collecting, the work was extended to the fresh waters on the Pacific slope a short distance to the east and west of the Canal Zone, in order to obtain a better understanding of the distribution of the fresh-water fishes of the Pacific coast streams than was obtainable from the small streams opposite the



FIG. 71.—Steamer *Cana* of the Darien Gold Mining Co., on which a trip was made from Panama City to Marraganti on the Rio Tuyra, eastern Panama. Photograph by Goldman.

Rio Chagres, and especially from the Rio Grande, because of the changes in this stream due to the work on the Canal.

The party continued operations for about three months, and much help was given by the Isthmian Canal Commission, the Panama Railroad and Steamship Company, and the Darien Gold Mining Company, to all of which organizations many thanks are due.

Upon his arrival in Panama on February 9, 1912, Mr. August Busck, of the Bureau of Entomology, was at once enabled to establish headquarters in the convenient comfortable dispensary in

Paraiso, through the courtesy of the Canal Commission. Here he made arrangements for visiting the islands of Taboga and Taboguilla



FIG. 72.—Waterfall from a small side-stream on the Rio Grande, near Cana, Darien, Panama. Photograph by Hildebrand.



FIG. 73.—Hydrographic Gauging Station, above Alhajucla, Panama. Photograph by Busck.

where certain conditions regarding mosquitoes, observed in 1911, suggested closer investigation.

Mr. Busck first spent a week on Taboguilla Island, which was at that time uninhabited, and was supplied with provisions by a daily boat from Taboga. It being in the height of the dry season, he established his camp with a mosquito-netted cot, acetylene lamps, and collecting sheets, halfway up the hillside, with no cover other



FIG. 74.—Cocoanut Palms, Paraiso, Panama; one normal, the other denuded by caterpillars. Photograph by Busck.

than a large mango tree. He then spent a week on Taboga Island, and early in March went up the Chagres River, making his headquarters in the gauging station at Alhajuella, and from that point explored the surrounding country, mainly along the tributaries of the Chagres and Chilibri Rivers, and especially the extensive limestone-cave region, which he had visited in 1911. On this trip he camped on the banks of the Chilibrillo River under the open sky,

and investigated the caves more thoroughly than had been possible previously. It was found that there is an upper series of dry caves and a lower series containing water. In the rainy season these latter become inaccessible subterranean rivers, and it was in them that the interesting bat-fauna was found, which Mr. G. S. Miller, Jr. has described in the Proceedings of the U. S. National Museum.

The last part of March was spent on the upper Trinidad River where exceedingly rich entomological results were obtained, partly through the night work with the acetylene lamps. Early in April Mr. Busck went to Porto Bello on the Atlantic side. From that



FIG. 75.—Porto Bello Bay, showing excavation in the mountain, where the rock used for the Gatun Dam was secured. Photograph by Busck.

place he made several trips with good results, but on one of these, up the coast to the Santa Rosa River, he unfortunately became ill and was forced to go to a hospital. Having recovered, he proceeded a week later to La Chorrera where the rainy season was at its height and the collecting proved excellent. He established himself there for two weeks, collecting beyond the savannah area in the foothills near the origin of the Trinidad River. The acetylene lamps and the white trap-sheets proved valuable adjuncts to the outfit, and much material was secured by collecting at night.

The last part of May was occupied with minor excursions in or near the Canal Zone; among these a short trip up the Chagres River. On June 1, he undertook a second trip up the Trinidad River, and found conditions quite different from what they were before, owing



FIG. 76.—Dry-season camp on Taboguilla Island, showing white sheets and acetylene lamp for night-collecting. Photograph by Busck.



FIG. 77.—Palms "up to their knees" in water; Trinidad River valley, Panama, now part of Gatun Lake. Photograph by Busck.

to the damming of the Gatun Lake. The old trails through the swamp and forest were flooded knee-deep, and the water rose half a foot a day during his stay. This handicapped the collector's work considerably, as all the operations had to be carried on from a dugout canoe. The remaining hilltops, however, proved all the richer in insect life, as well as in other animal life. The augmentation of the



FIG. 78.—Tied up for the night, on the upper Chagres River. Photograph by Hildebrand.

mosquito fauna proved as interesting as it did annoying to the collector.

About the middle of June, Mr. Busck returned from this locality, which in another few months would become totally submerged, departed for New York, and arrived in Washington June 24.

Dr. C. D. Marsh, of the Bureau of Plant Industry, accompanied the survey party to the Canal Zone to make typical collections of the plankton organisms in the fresh waters of the Atlantic and Pacific slopes of the Isthmus. He arrived at Cristobal on January 15, 1912,

established his headquarters at Empire, and remained in the field until February 16.

The topography of the Zone is such that it is not a particularly good collecting ground for plankton. The region visited is practically destitute of lakes, there are but few permanent pools, and although the lowlands of the Atlantic slopes form a huge swamp, the waters in this locality are so connected that no great variety of forms is found. The south slope is abrupt, with no permanent bodies of water, and the streams are small and more or less temporary.



FIG. 79.—Rio Grande Reservoir, Canal Zone, showing workmen clearing the shores to prevent decaying vegetation from falling into the water. This is an old reservoir dating from the time of the French occupation. Photograph by Marsh.

Especial attention was paid to the old reservoirs which form little lakes, and ordinarily would contain some of the typical flora and fauna of the immediate region, but these bodies of water are "plankton poor," as compared with similar bodies in a temperate climate; for, inasmuch as the temperature of the air is practically uniform throughout the year, there is no vertical circulation of the water, except where it is shallow enough to be affected by the winds. The conditions at the bottom of the deeper waters of the reservoirs are such as to make life impossible. Careful collections were made

from all these reservoirs and the streams supplying them, from the embryonic Gatun Lake, its adjacent swamps, and from the waters



FIG. 80.—Rocky Island in Panama Bay, showing Frigate birds. Plankton collections were made near this spot. Photograph by Marsh.



FIG. 81.—Collecting Entomostraca in Black Swamp, Canal Zone. This locality will be covered by Gatun Lake. Photograph by Marsh.

of the Chagres and Trinidad Rivers, as well as from the streams and pools of the southern slope, and in the harbors of Colon and

Panama. Owing to the short time available for this work, very little collecting was done outside the Zone. While these collections have been examined only in a preliminary way, enough has been done to make it evident that there are some distinct differences in the faunas of the two sides of the Isthmus.

Professor Henry Pittier, of the Department of Agriculture, who has had charge of the general botanical collecting for the survey since its inception in 1910, remained in the field to continue his work, especially the collecting of ferns and lower cryptogams, from May, 1912, throughout that year. An anticipated trip to the Darien country was postponed on account of an accident to the only steamer plying between Panama and the ports of Darien, which forced Professor Pittier to remain in Culebra until January 23, 1912. A little later he secured passage to Darien where he explored the Cugra River and the Sambu Valley near Garachine Point.

Following the completion of his trips in south Darien and to Chiriqui, he went to Venezuela, whence he will return to the United States about April, 1913.

BOTANICAL OBSERVATIONS BY DR. J. N. ROSE IN EUROPE AND IN KANSAS

Dr. J. N. Rose, Associate in Botany, U. S. National Museum, at present detailed to the Carnegie Institution for the purpose of making an exhaustive study of the Cactaceæ of America, spent several months visiting the botanical gardens and institutions of Europe, and making preliminary arrangements for various exchanges. Among the places visited were the Kew Gardens, the Jardin des Plantes at Paris, the Conservatory and Botanical Garden at Geneva, the Royal Botanical Gardens at Munich and Berlin, and the Hanbury Botanic Garden in northern Italy. This last is a private garden belonging to Lady Katherine Hanbury and known as the *Hortus Mortolensis*. It lies on the shore of the Mediterranean in the little Italian village of La Mortola, about half way between the towns of Ventimiglia, Italy, and Mentone, France, in the most beautiful part of the Riviera, and during the winter and spring is the main feature of interest in all that region. Its area comprises 112 acres. The most broken and rugged parts are allowed to grow wild; some of the hills being covered by groves of native pines which suggest the hemlocks in the New York Botanical Garden. The other parts of the grounds have been beautifully terraced with convenient walks and stone steps, from which can be seen, through vistas here and

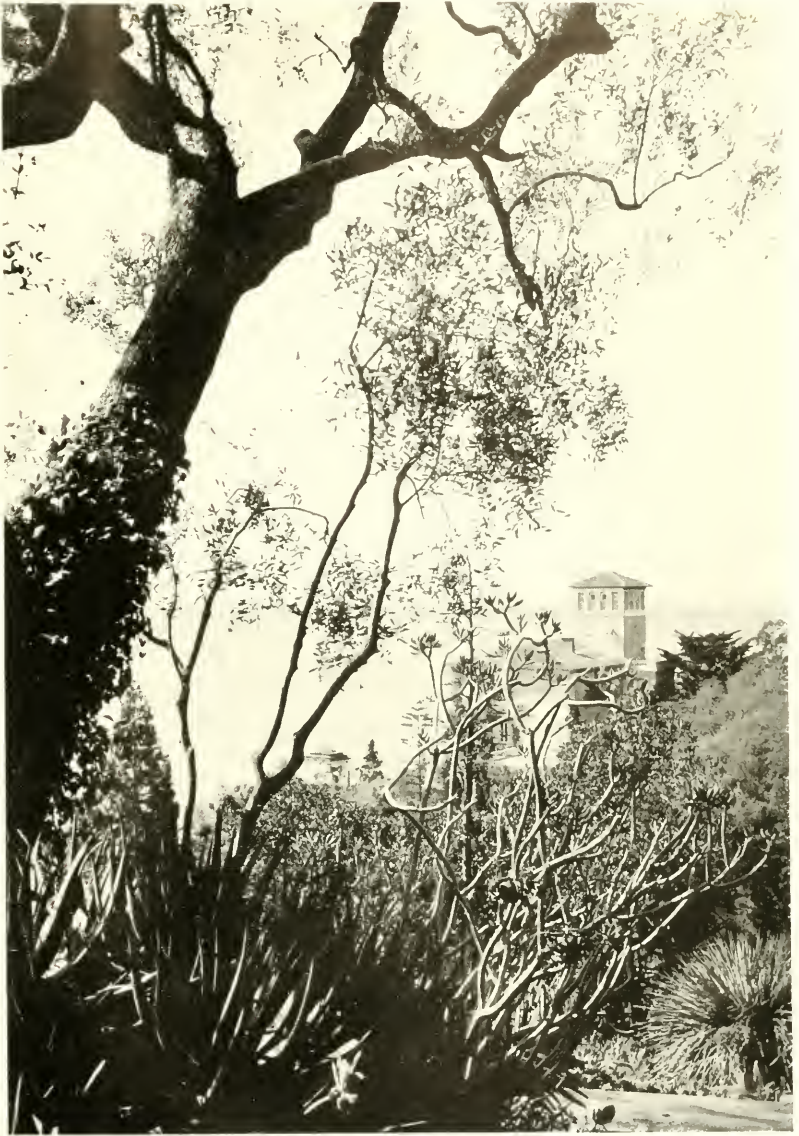


FIG. 82.—View of the Hanbury Botanic Garden from the northeast, showing olive tree and aloe plant on the left. Photograph by Nenke and Ostermaier, Dresden.

there, the Mediterranean and the nearby hills and mountains. The garden is more than simply a pleasure ground. It has been developed by Mr. Alwin Berger so as to be of great scientific value. The amount of material sent out for exchange purposes, both in the way of seeds and living plants, is enormous. A collection of succulent plants which has no counterpart in the world, and is well suited to the dry, hot summers of this region, has been assembled, and this place is fast becoming the Mecca for the study of such plants. No student of desert plants of America or South Africa can afford to omit this garden from his itinerary when visiting Europe. In connection with the garden there is a small museum building, a library, and an herbarium.

In September, Dr. Rose in company with William R. Fitch, made a botanical excursion through the western part of Kansas, collecting cactaceæ and other flowering plants. Although the region is extremely arid, a very fair collection was made. A full set of this material, as also from the collection made by Dr. Rose in Europe, has been deposited in the U. S. National Herbarium.